enclosure for keeping the partial pressure of oxygen in the pretreatment region low.

23. (Amended) The coal pyrolysis pretreatment process of claim 11, further comprising transferring the pretreated coal to a pyrolysis retort in the absence of air.

REMARKS UNDER 37 C.F.R. 1.111

All remaining claims are allowable.

Allowed claims 5 and 15 have been combined into their parent claims 1 and 11.

Allowed claims 7, 8, 10, 17, 18 and 20 have been combined with their parent claims.

Claim 21 has previously been allowed.

Claims 22 and 23 have been made dependent on the allowed process claim 11.

All claims are allowable.

CONCLUSION

Allowance of claims 1-4, 6-14 and 16-23 are requested.

Respectfully,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 1 and 15 have been cancelled without prejudice.

Claims 1, 6, 7, 8, 10, 11, 17, 18, 20, 22 and 23 have been amended as below:

1. (Amended) A coal pyrolysis pretreatment apparatus comprising a pretreatment vessel for holding a bed of coal particles, a preheater for heating the bed of coal particles to a temperature below the coal pyrolysis temperature range, an enclosure around the vessel for preventing air from contacting the bed of coal particles, [and] an oxygen remover for removing the oxygen released from the heated coal particles and transporting it away from the enclosure so that the partial pressure of oxygen in the pretreatment region is kept low, and a vibrating machine connected to the vessel for vibrating the vessel and providing rapid mixing and heating of coal particles entering the bed from the input to provide uniform removal of oxygen from coal particles.

6. (Amended) The apparatus of claim 1, further comprising a gas [inlet] input connected to the vessel for contacting the coal particles in the bed with a sweep gas of low oxygen content, and a gas outlet connected to the enclosure for removing the sweep gas before the oxygen extracted from the coal particles builds up in the sweep gas and inhibits the deoxidation process.

7. (Amended) [The apparatus of claim 6, further comprising] A coal pyrolysis pretreatment apparatus comprising a

pretreatment vessel for holding a bed of coal particles, a preheater for heating the bed of coal particles to a temperature below the coal pyrolysis temperature range, an enclosure around the vessel for preventing air from contacting the bed of coal particles, an oxygen remover for removing the oxygen released from the heated coal particles and transporting it away from the enclosure so that the partial pressure of oxygen in the pretreatment region is kept low, and a flue gas source connected to [the] a gas input for supplying low oxygen concentration flue gas as an oxygen removal sweep gas to the bed of coal.

8. (Amended) [The apparatus of claim 1] A coal pyrolysis pretreatment apparatus comprising a pretreatment vessel for holding a bed of coal particles, a preheater for heating the bed of coal particles to a temperature below the coal pyrolysis temperature range, an enclosure around the vessel for preventing air from contacting the bed of coal particles, an oxygen remover for removing the oxygen released from the heated coal particles and transporting it away from the enclosure so that the partial pressure of oxygen in the pretreatment region is kept low, further comprising a collector for collecting non-condensable combustible gases from coal pyrolysis, and a burner for partially burning the collected non-condensable combustible gases and supplying hot, partially combusted non-condensable gases from the burner to the bed of coal particles to serve as a sweep gas for heating and removing oxygen from the bed of coal particles.

10. (Amended) [The apparatus of claim 1] A coal pyrolysis pretreatment apparatus comprising a pretreatment vessel for holding a bed of coal particles, a preheater for heating the bed of coal particles to a temperature below the coal pyrolysis temperature range, an enclosure around the vessel for preventing air from contacting the bed of coal particles, an oxygen remover for removing the oxygen released from the heated coal particles and transporting it away from the enclosure so that the partial pressure of oxygen in the pretreatment region is kept low, wherein the preheater comprises a furnace holding ceramic balls of a size larger than coal particles in the bed, and provisions for circulating the ceramic balls from the furnace to the bed of coal particles for heating the coal particles in the pretreatment vessel and recycling the balls through the furnace for reheating.

11. (Amended) A coal pyrolysis pretreatment process comprising heating [the] a bed of coal particles in a vessel to a temperature below the coal pyrolysis temperature range, preventing air from contacting the bed of coal particles, and removing oxygen released from the heated coal particles from the enclosure before subjecting the coal to pyrolysis vibrating the vessel and providing rapid mixing and heating of coal particles entering the bed from an input to provide uniform removal of oxygen from coal particles.

17. (Amended) [The process of claim 16 further comprising] A coal pyrolysis pretreatment process comprising heating the bed of coal particles to a temperature below the coal pyrolysis

temperature range, preventing air from contacting the bed of coal particles, and removing oxygen released from the heated coal particles from the enclosure before subjecting the coal to pyrolysis, supplying low oxygen flue gas as oxygen removal gas to the bed of coal.

18. (Amended) [The process of claim 11, further comprising] A coal pyrolysis pretreatment process comprising heating the bed of coal particles to a temperature below the coal pyrolysis temperature range, preventing air from contacting the bed of coal particles, and removing oxygen released from the heated coal particles from the enclosure before subjecting the coal to pyrolysis, collecting non-condensable combustible gases from coal pyrolysis, and burning the collected non-condensable combustible gases for heating the bed of coal, and supplying partially combusted collected non-condensable gases from the burner to the bed of coal particles for removing oxygen from the bed of coal particles.

20. (Amended) [The process of claim 11] A coal pyrolysis pretreatment process comprising heating the bed of coal particles to a temperature below the coal pyrolysis temperature range, preventing air from contacting the bed of coal particles, and removing oxygen released from the heated coal particles from the enclosure before subjecting the coal to pyrolysis, wherein the heating comprises heating in a furnace ceramic balls of a size larger than coal particles in the bed, and circulating the heated ceramic balls from the furnace to the bed of coal particles for

heating the coal particles in the vessel and recycling the balls through the furnace.

22. (Amended) [A] The process of coal pyrolysis pretreatment of claim 11, further comprising providing a pretreatment vessel for holding [a] the bed of coal particles, [heating the bed of coal particles to a temperature below the coal pyrolysis temperature range in a preheater, preventing air from contacting the bed of coal particles in an enclosure around the vessel,] and [removing] transporting the oxygen released from the heated coal particles [and transporting it] away from the enclosure for keeping the partial pressure of oxygen in the pretreatment region low.

23. (Amended) The [process of] coal pyrolysis pretreatment process of claim 11, further comprising [contacting coal particles in a bed with an oxygen removal gas, removing the oxygen removal gas with oxygen removed from the coal particles, and] transferring the pretreated coal to a pyrolysis retort in the absence of air.